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APPLICATION NUMBER: *60/536,866*
FILING DATE: *January 16, 2004*
RELATED PCT APPLICATION NUMBER: *PCT/US05/01271*

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PROVISIONAL APPLICATION FOR PATENT COVER SHEET

This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53(c).

Express Mail Label No. EV 411721407 US

INVENTOR(S)

Given Name (first and middle [if any])	Family Name or Surname	Residence (City and either State or Foreign Country)
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LAWRENCE J.	ROSEN	LIVINGSTON, NJ 07039

☐ *Additional inventors are being named on the ____ separately numbered sheets attached hereto*

TITLE OF THE INVENTION (500 characters max)

MAGNETIC CONSTRUCTION MODULES FOR CREATING THREE-DIMENSIONAL ASSEMBLIES

Direct all correspondence to: **CORRESPONDENCE ADDRESS**

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ENCLOSED APPLICATION PARTS *(check all that apply)*

☒ Specification *Number of Pages* 8 ☐ CD(s), Number

☒ Drawing(s) *Number of Sheets* 3 ☐ Other (specify)

☐ Application Data Sheet. See 37 CFR 1.76

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☒ Applicant claims small entity status. See 37 CFR 1.27.

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The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.

☒ No.

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Respectfully submitted,

SIGNATURE _____ Date 01/16/04

TYPED or PRINTED NAME WILLIAM SMITH REGISTRATION NO. *(if appropriate)* 46,459

TELEPHONE (973) 848-5365 Docket Number: 67895/40096

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FEE TRANSMITTAL for FY 2004

Effective 10/01/2003. Patent fees are subject to annual revision.

☒ Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT ($) $80.00

Complete if Known	
Application Number	To be assigned
Filing Date	01/16/04
First Named Inventor	Charles J. Kowalski
Examiner Name	To be assigned
Art Unit	To be assigned
Attorney Docket No.	67895/40096

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☐ Check ☐ Credit card ☐ Money Order ☐ Other ☐ None

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FEE CALCULATION

1. BASIC FILING FEE

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description	Fee Paid
1001	770	2001	385	Utility filing fee	
1002	340	2002	170	Design filing fee	
1003	530	2003	265	Plant filing fee	
1004	770	2004	385	Reissue filing fee	
1005	160	2005	80	Provisional filing fee	80.00

SUBTOTAL (1) ($) $80.00

2. EXTRA CLAIM FEES FOR UTILITY AND REISSUE

	Extra Claims			Fee from below	Fee Paid
Total Claims		-20** =	0	X =	0.00
Independent Claims		- 3** =	0	X =	0.00
Multiple Dependent				=	

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description
1202	18	2202	9	Claims in excess of 20
1201	86	2201	43	Independent claims in excess of 3
1203	290	2203	145	Multiple dependent claim, if not paid
1204	86	2204	43	** Reissue independent claims over original patent
1205	18	2205	9	** Reissue claims in excess of 20 and over original patent

SUBTOTAL (2) ($) $0.00

***or number previously paid, if greater; For Reissues, see above*

FEE CALCULATION (continued)

3. ADDITIONAL FEES

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description	Fee Paid
1051	130	2051	65	Surcharge - late filing fee or oath	
1052	50	2052	25	Surcharge - late provisional filing fee or cover sheet	
1053	130	1053	130	Non - English specification	
1812	2,520	1812	2,520	For filing a request for *ex parte* reexamination	
1804	920*	1804	920*	Requesting publication of SIR prior to Examiner action	
1805	1,840*	1805	1,840*	Requesting publication of SIR after Examiner action	
1251	110	2251	55	Extension for reply within first month	
1252	420	2252	210	Extension for reply within second month	
1253	950	2253	475	Extension for reply within third month	
1254	1,480	2254	740	Extension for reply within fourth month	
1255	2,010	2255	1,005	Extension for reply within fifth month	
1401	330	2401	165	Notice of Appeal	
1402	330	2402	165	Filing a brief in support of an appeal	
1403	290	2403	145	Request for oral hearing	
1451	1,510	1451	1,510	Petition to institute a public use proceeding	
1452	110	2452	55	Petition to revive - unavoidable	
1453	1,330	2453	665	Petition to revive - unintentional	
1501	1,330	2501	665	Utility issue fee (or reissue)	
1502	480	2502	240	Design issue fee	
1503	640	2503	320	Plant issue fee	
1460	130	1460	130	Petitions to the Commissioner	
1807	50	1807	50	Processing fee under 37 CFR § 1.17(q)	
1806	180	1806	180	Submission of Information Disclosure Statement	
8021	40	8021	40	Recording each patent assignment per property (times number of properties)	
1809	770	2809	385	Filing a submission after final rejection (37 CFR § 1.129(a))	
1810	770	2810	385	For each additional invention to be examined (37 CFR § 1.129(b))	
1801	770	2801	385	Request for Continued Examination (RCE)	
1802	900	1802	900	Request for expedited examination of a design application	

Other fee (specify) _____

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SUBTOTAL (3) ($) $0.00

SUBMITTED BY

Name (Print/Type)	WILLIAM SMITH	Registration No. (Attorney/Agent)	46,459	Telephone	(973) 848-5369
Signature				Date	01/16/04

Complete *(if applicable)*

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67895/40096

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re patent application of :
CHARLES J. KOWALSKI, ET AL. :
:
Serial No.: TO BE ASSIGNED :
:
Filed: FILED HEREWITH :
:
For: MAGNETIC CONSTRUCTION :
MODULES FOR CREATING THREE- :
DIMENSIONAL ASSEMBLIES :
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Judith M. Traina
Judith M. Traina

MAGNETIC CONSTRUCTION MODULES FOR CREATING THREE-DIMENSIONAL ASSEMBLIES

Field of the Invention

The present invention relates to construction modules having magnetic surfaces and which can be magnetically coupled to form three-dimensional assemblies.

Background of the Invention

U.S. Patent No. 6,566,992 and German Patent No. DE 202 02 183 U1 describe structures that can be created by connecting bars or plates containing magnets and ferromagnetic balls. The '992 Patent discloses that three-dimensional structures can be created from balls and bars joined by magnetic attraction. However, self-supporting structures of bars and balls are limited to those made from triangular units (i.e. closed structures of three bars and three balls). The '183 Patent describes flat triangles, squares and rectangles used in conjunction with ferromagnetic balls to create a limited range of geometric constructions. The flat shapes disclosed in the '183 Patent consist of magnets inserted in the corners of a triangular or square piece, or six magnets in a rectangular plate which can be attached to steel balls to create a limited number of three-dimensional shapes.

Summary of the Invention

The present invention utilizes planar square modules which can be assembled to to form a wide range of three-dimensional structures. Each of the square

modules has magnets permanently inserted in each of its four corners. A fifth magnet is inserted permanently at the midpoint of one edge of the square module. Each of the square modules has a slot opening at the midpoint of one edge and has a width that is equal to the thickness of the square module. Two square modules can be assembled by joining them at their slots to form a three-dimensional cruciform structure. More complex structures can be formed from square modules, cruciform structures and/or ferromagnetic balls, which are held together by attraction of the magnets in the square modules. The magnetic construction modules of the present invention provide a greatly expanded range of self-supporting, three-dimensional structures compared to those provided by the prior art.

Brief Description of the Drawings

For a better understanding of the present invention, reference is made to the following detailed description of various exemplary embodiments considered in conjunction with the accompanying drawings, in which:

FIG. 1A is an elevational view of a square module constructed in accordance with one exemplary embodiment of the present invention, the module containing five magnets having exposed surfaces whose polarities are indicated by an "S" or an "N" designation.

FIG. 1B is a top plan view of the square module of FIG. 1A.

FIG. 2 is a perspective view showing the module of FIG. 1 interlocked with another identical module to make a cruciform assembly.

FIG. 3 is an partially cut-away elevational view showing a square module constructed in accordance with another exemplary embodiment of the present invention.

FIG. 4 is a perspective view showing the cruciform assembly of FIG. 2 stacked on top of another identical cruciform assembly.

FIG. 5 is a perspective view of an assembly made from three of the modules shown in FIG. 1A, two of which are in the form of the cruciform assembly of FIG. 2.

FIG. 6 is a perspective view of the assembly of FIG. 5 shown in combination with another cruciform assembly and two ferromagnetic balls attached to various magnetic surfaces of the assembly.

FIG. 7 is a perspective view of the stacked assemblies of FIG. 4 oriented horizontally, rather than vertically, with two ferromagnetic balls attached to magnetic surfaces at the free ends of the assemblies.

Disclosure of the Invention

As shown in FIGS. 1A and 1B, a planar square module 10 is fabricated as a square plate of thickness "T", having opposed planar surfaces 12, 14, edges 16, 18, 20, 22 and corners 24a, 24b, 24c, 24d biased at about 45 degrees. Magnets 26a, 26b, 26c, 26d are inserted permanently in each of the four corners 24a, 24b, 24c, 24d of the square module 10 with one surface 28a, 28b, 28c, 28d of each magnet exposed. The magnets 26a, 26b, 26d, 26e are oriented so that their exposed surfaces 28a, 28b, 28c, 28d in adjacent corners (e.g., corners 26a and 26b) have opposite polarities to each

other, indicated in FIG. 1A as N for north and S for south. A fifth magnet 26e is inserted permanently at the midpoint of the edge 16 of the square module 10 so that one surface 28e of the magnet 26e is exposed. The exposed surface 26e may have either polarity N or polarity S. A slot 34 opens at the midpoint of the edge 20 of the square module 10, so that it is diametrically opposite to the magnet 26e. The slot 34 has a width "W" that is equal to or slightly greater than the thickness "T" of the square module 10 and extends parallel to the edges 18, 22, preferably to half of the distance between the edge 20 and the edge 16.

The square module 10 may be fabricated from a solid plate 30 with pockets 32a, 32b, 32c, 32d, 32e in the corners 24a, 24b, 24c, 24d and the middle of the edge 16, respectively, formed by molding or drilling the pockets 32a, 32b, 32c, 32d, 32e into the solid plate 30, or by some other method known in the art. Each pocket 32a, 32b, 32c, 32d, 32e has a size and shape such that the corresponding magnet 26a, 26b, 26c, 26d, 26e can be inserted permanently into the respective pocket 32a, 32b, 32c, 32d, 32e. Each magnet 26a, 26b, 26c, 26d, 26e and its corresponding pocket 32a, 32b, 32c, 32d, 32e may be cylindrical, rectangular, or have some other shape depending on the magnetic attraction desired.

FIG. 2 shows a three-dimensional cruciform assembly 36 formed by interlocking the square module 10 with another identical square module 10'. The modules 10, 10' preferably are identical to each other. In FIG. 2, corresponding elements of each module 10, 10' have the same reference numerals, with the elements of module 10' being differentiated from those of module 10 by use of a prime symbol (e.g., module 10 is provided with a corner magnetic surface 28d and module 10' is

provided with a corner magnet 28d'). With the foregoing explanatory comments in mind, each of the slots 34, 34' of the square modules 10, 10' slides completely over the planar surfaces 12, 14, 12', 14' of the other module 10, 10' to create a cruciform assembly 36, in which the planar surfaces 12, 14' of the two square modules 10, 10' are oriented at 90 degrees to each other. The edge 16 of one square module 10 preferably is flush with the edge 20 of the other square module 10. Similarly, the edge 16' of one square module 10' preferably is flush with the edge 20' of the other square module 10'. The magnetic surfaces 28e, 28e' of the respective square modules 10, 10' are diametrically opposed to each other on the cruciform assembly 36.

In an alternative embodiment, two identically shaped members, such as member 38 of FIG. 3, are joined to form a hollow square plate 39 having a similar arrangement of elements to the square module 10. Each member 38 has half-pockets 40a, 40b, 40c, 40d, 40e, a slot 42 and a raised edge 44 integrally formed therein. The raised edge 44 generally runs along the perimeters of the member 38 and the slot 42, except where it defines the half-pockets 40a, 40b, 40c, 40d, 40e. Two identically shaped members 38 may be joined by glue or by welding along their respective raised edges 44, forming a hollow plate 39 having a central compartment 41. The half-pockets 40a, 40b, 40c, 40d, 40e on one member 38 are aligned with and joined to the half pockets 40a', 40b', 40c', 40d', 40e' of a mirror image member 38' to form pockets 32a, 32b, 32c, 32d, 32e for insertion of the respective magnets 26a, 26b, 26c, 26d, 26e. An object, such as a label or decoration, may be placed within the compartment of the hollow plate 39 to enhance its appearance. The members 38, 38' may be formed in different colors or of different materials.

As shown in FIGS. 4-7, a wide variety of assembled structures, ranging from the simple to the extremely complex, can be created by the imaginative user by combining cruciform assemblies 36, square modules 10 and ferromagnetic balls 46.

The assembly 48 of FIG. 4 is formed by joining a cruciform assembly 36 to a cruciform assembly 36' having components and reference numbers identical to those of the cruciform assembly 36 (see FIG. 2). The cruciform assemblies 36, 36', are joined at the magnetic surface 28e of the cruciform module 36' and the magnetic surface 28e' of the cruciform module 36, both magnetic surfaces 28, 28e' being hidden in FIG. 4 by the cruciform modules 36, 36'. The orientation of the cruciform modules 36, 36' with respect to each other is maintained by the magnetic attraction of their respective corner magnets where the two cruciform modules 36, 36' adjoin each other (e.g., magnet 26c of assembly 36 and magnet 26d of assembly 36' are attracted to each other and magnet 26c' of assembly 36 and assembly 26d' of assembly 36' are attracted to each other).

In the assembly 50 of FIG. 5, the cruciform assembly 36 of FIG. 2 has been joined to a square module 10", which has the same elements as square modules 10, 10' except that the reference numbers of 10" are denoted by a double-prime symbol. A square module 10 of cruciform assembly 36 is inserted into the slot 34" of square module 10". The square module 10" is held in place by magnetic attraction between corner magnet 26b" of square module 10" and corner magnet 26c of cruciform assembly 36 and between corner magnet 26c" of square module 10" and corner magnet 26b of cruciform assembly 36, both magnet 26c" and magnet 26b being hidden in FIG. 4.

In the assembly 52 of FIG. 6, a second cruciform assembly 36' has been attached to the cruciform assembly 36 of FIG. 5 through magnetic attraction between corner magnet 26d of assembly 36 and corner magnet 26a of assembly 36' and between corner magnet 26c of assembly 36 and corner magnet 26b of assembly 36' (corner magnets 26c and 26d are hidden in FIG. 6). Ferromagnetic balls 46, shown in FIG. 6 as being joined to corner magnet 26a of cruciform assembly 36 and end magnet 26e" of square module 10" (both magnet 26a and magnet 26e" being hidden in FIG. 6), may be used as connectors to other square modules or cruciform assemblies oriented at any of a wide range of angles relative to the planar surfaces of the assemblies when the ferromagnetic balls 46 are attached to magnets of any type.

A rotating structure, such as the assembly 54 of FIG. 7, may be created by magnetically attaching ferromagnetic balls 46 to the magnets 26e, 26e' which are at opposite ends of the assembly 48 (i.e., magnet 26e of assembly 36 and magnet 26e' of assembly 36', both of said magnets being hidden in FIG. 7). The assembly 48 can be made to rotate freely while the ferromagnetic balls 46 are held stationary. For example, magnetic attraction/repulsion from nearby magnets can be used in conjunction with the rotating structure 48 to create a motor.

Although the invention disclosed herein has been described with reference to particular embodiments, it is to be understood that these embodiments are merely illustrative of the principles and applications of the present invention. It is therefore to be understood that numerous modifications may be made to the illustrative embodiments and that other arrangements may be devised without departing from the spirit and scope of the invention. For example, the planar modules may be made in

other rectangular shapes than a square, or in shapes having a number of corners other than four, such as triangular or hexagonal shapes. The slots may be formed so as to open at a corner of a planar module and extend inward at an angle to one or more edges of the module. The shape of the slot itself may be formed so that the planar surfaces of two interlocked modules are oriented at some angle other than 90 degrees.

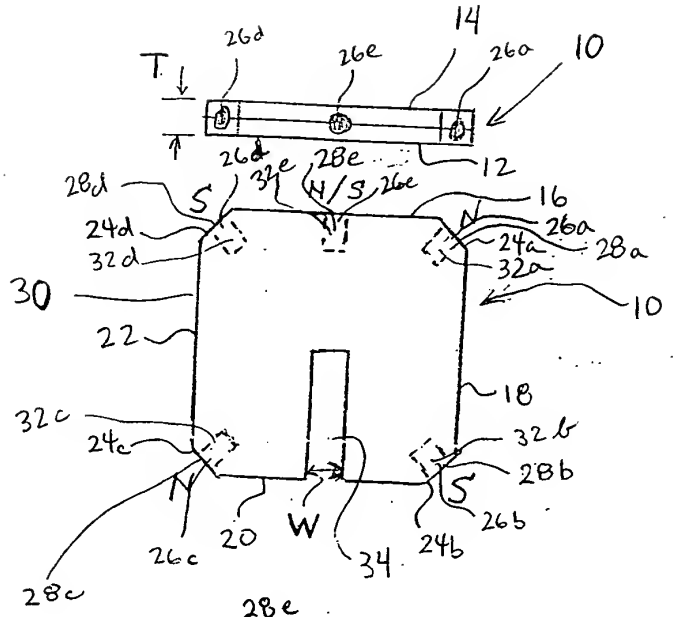

FIG. 1B

FIG. 1A

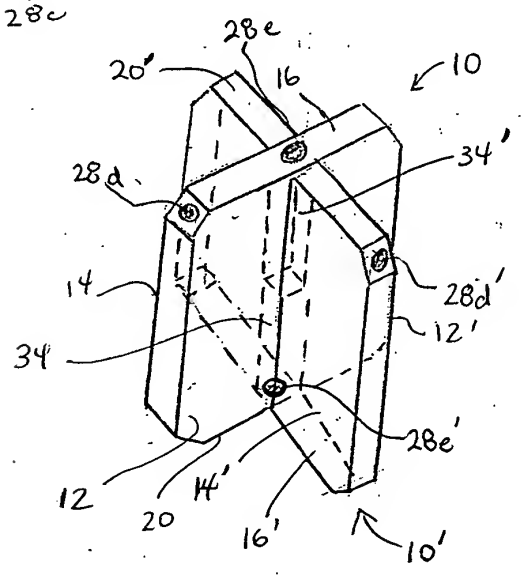

FIG. 2

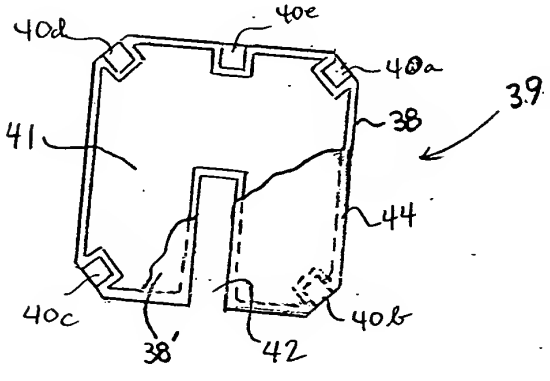

FIG. 3

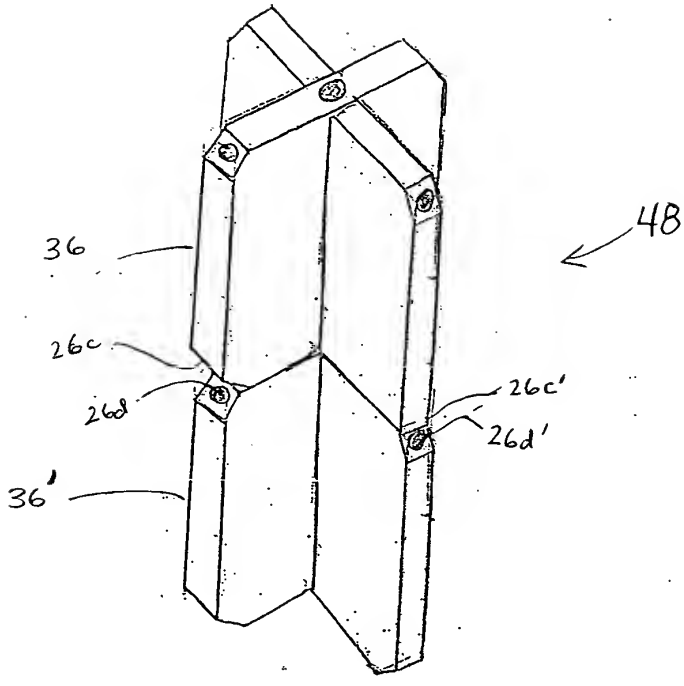

FIG. 4

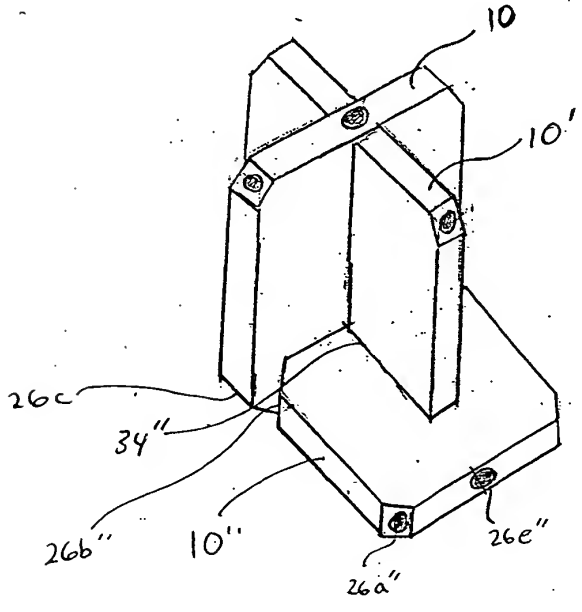

FIG. 5

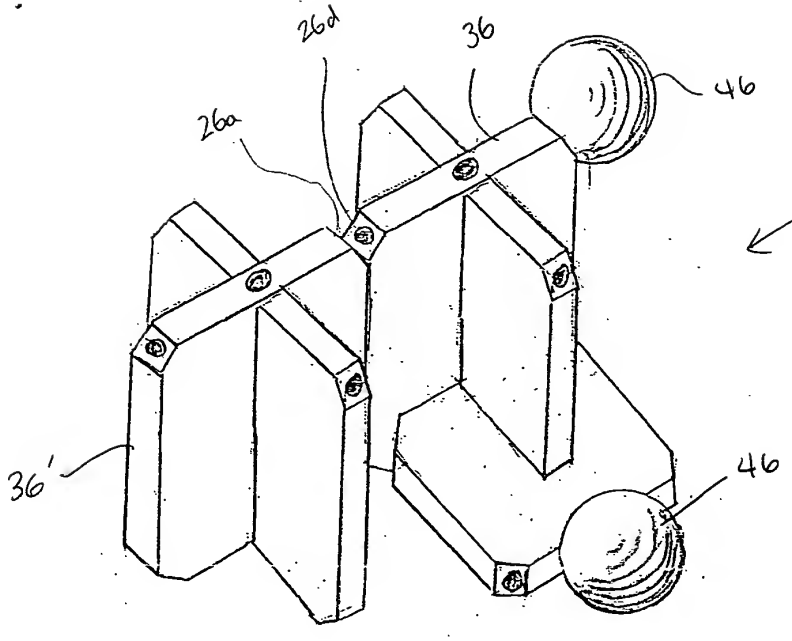

FIG. 6

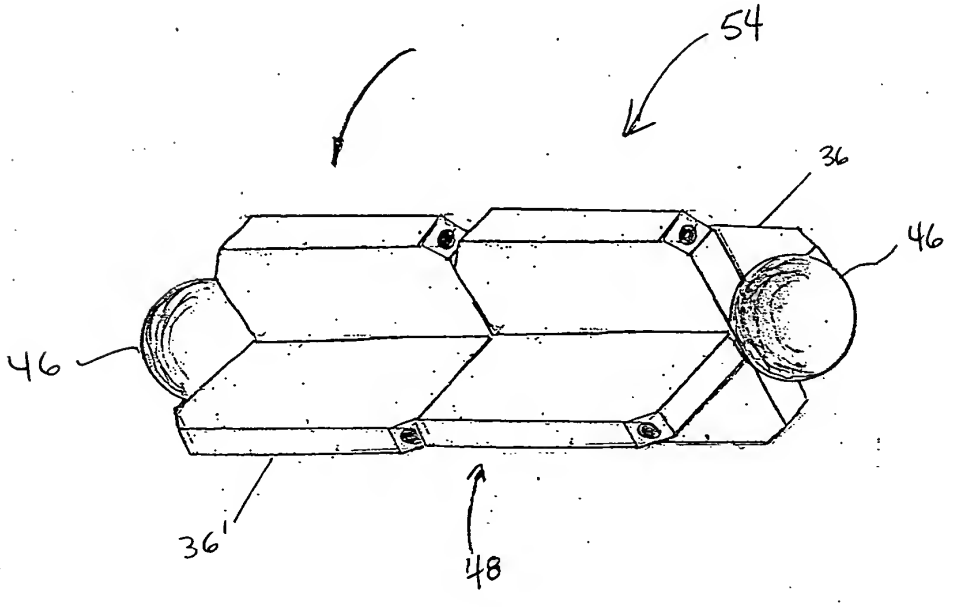

FIG. 7